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AUTHOR Kasper, Deirdre; Welsh, Sarah; Chambliss, Catherine
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ABSTRACT

The relationship between videogame usage, active exercise, television viewing, and measures of blood pressure is explored. Videogame participation, especially playing sports or action games, simulates involvement in aggressive situations. This may activate the fight or flight response in players. This response has been associated with blood chemistry changes which may be linked to cardiac risks. College students who play these games excessively may, therefore, place themselves at greater risk of developing cardiovascular problems. Because active exercise seems to neutralize some of these problematic blood chemistry changes, those videogame players who remain physically active should attenuate their risk. Twenty males ages 18 to 22 and three females ages 19 to 20 were given a questionnaire to measure their videogame and television usage and exercise patterns. Smoking habits were also assessed. Both diastolic and systolic blood pressures were somewhat lower among participants in the low videogame usage group than among those in the medium and high usage groups. This pilot investigation suggests the need for additional research exploring the possible detrimental effects of high levels of videogame usage using a larger, more representative sample. (EMK)

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Educating Students About the Risks of Excessive Videogame Usage

Deirdre Kasper

Sarah Welsh

Catherine Chambliss, Ph.D.

Ursinus College

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C Chambliss

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Abstract

Children and young adults are devoting increasing amounts of time to videogame activities and less to educational pursuits and active exercise. Videogame participation, especially playing sports or action games, simulates involvement in aggressive situations. This may activate the fight-or-flight response in players. This response has been associated with blood chemistry changes (such as elevated triglyceride and free-fatty acid levels) possibly linked to cardiac risks. College students who play these games excessively may, therefore, place themselves at greater risk of developing cardiovascular problems. Since active exercise seems to neutralize some of these problematic blood chemistry changes, those videogame players who remain physically active should attenuate their risk.

This investigation explored the relationship between videogame usage, active exercise, television viewing, and measures of blood pressure. Twenty males ages 18-22 and three females ages 19-20 were given a questionnaire to measure their videogame and television usage and exercise patterns. Smoking habits were also assessed, as this can have detrimental effects on their health possibly resulting in elevated blood pressure. Blood pressure was assessed while subject were sitting at rest.

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Both diastolic and systolic blood pressures were somewhat lower among participants in the low videogame usage group than among those in the medium and high usage groups. This pilot investigation suggests the need for additional research exploring the possible detrimental effects of high levels of videogame usage, using a larger, more representative sample.

Introduction

Videogames were first introduced in the 1970's with companies such as Atari being the first to bring a new interactive entertainment technology into arcades and our living rooms. However, interest in videogames greatly decreased in the late 1970's and it was not until the late 1980's that the Japanese Nintendo system prompted resurgence in videogame sales. Since that time there have been enormous advances in the technology of videogames and the popularity and usage of videogames has only increased. Today there are familiar companies still making the product but they are making it with greater details, graphics, and sounds so that it is almost like watching a movie. Interest in this new format has been shown by an in increase in annual sales from $100 million in 1985 to $4 billion in 1990 (Irwin and Gross, 1995).

To date, much of the large-scale research carried out on videogame playing and its possible detrimental effect on health has been extrapolated from early studies of television viewing or from studies of arcade play or first generation videogames like Atari (Phillips et al., 1995). With such systems available today like Nintendo 64 and Sony Play Station, it is important that more recent research be conducted in order to site any harmful effects on development, both physical and psychological, these new formats may have. The once famous game Pitfall consisted simply of a stick figure leaping over blue water with the occasional alligator chomping after his feet. Whereas today, classics such as Pitfall have been changed into action packed adventures entitled Super Pitfall 3-D where the only thing similar with the old game is the title and concept.

Although a few positive effects of videogame usage have been found, the majority of research that has already been done deals with the overwhelmingly negative aspects of playing videogames. For example, past research has examined the possibility of a connection between participation in videogame activity and gambling. Gambling is becoming increasingly popular among younger adults just as videogames already are. It has been implied that videogames and gambling activities have related attractive features and intermittent reinforcement schedules (Gupta and Derevensky, 1996). Although the influence of video-games on excessive gambling habits needs to be further researched, Ladouceur and others (1995) found that the rate of pathological gamblers (10%) who frequent arcades is more than twice as high as the rates reported in other studies with

adolescents and adults. Gupta and Derevensky (1996) gave out a questionnaire to explore videogame and gambling habits (if there were any) and administered a computerized blackjack game to each subject. Their findings suggested that high frequency videogame players verse low frequency videogame players gamble more, report that gambling makes them feel more important, and take greater risks on the blackjack gambling tasks.

Another area of research is the wide number of positive and negative effects videogames have on our physical well being. Videogame participation involves players directly as they operate various levers and buttons, all the while strategizing and preparing mentally for their next move. What many game players don't realize is just how that can physically affect them. In a study by Segal and Dietz (1991) 32 subjects' metabolic and cardiovascular responses were monitored while they played a well-known videogame. Findings revealed that the subjects had increased heart rate, systolic and diastolic blood pressure, and oxygen consumption while they played compared with their resting measurements. Segal and Dietz concluded that although the physiological response of playing videogames is very much like a mild-intensity exercise, it does nothing to improve physical fitness in youth. Brasinbton (1990) has found tendinitis to be highly associated with excessive playing of videogames.

Denot-Ledunois et al. (1997) wanted to establish the effects of videogames on breathing patterns. They concluded that videogames have different psycho-physiological components like arousal and emotion. However, players also tend to focus so much attention on the game that all movement-including breathing-is inhibited. In their study they wanted to concentrate on what effects the attentional load might have on breathing while the subjects were playing. In a low emotional experiment, they found that focusing attention did tend to hinder breathing.

Another effect on physical well being was found in a review of 35 reported cases of videogame related seizures was published by Graf and others (1994). They are said to be caused by the high-intensity, multicolored flashes and overall excitatory nature of videogames. The researchers concluded that abstinence by itself successfully treated 73% of the cases; for those who could not stop playing, valproic acid was recommended.

Much of the research has focused on videogames and their effect on aggression. Determining whether or not violent videogames cause aggression is complex because it's difficult to separate the role of playing videogames from other contributing factors. However Kirsh (1998) concluded results that offer some support for the contention that violent video- games lead to the development of a short-term hostile attribution bias which leads to seeing the world in a negative way.

In a number of other studies experimenters have observed subjects in a free-play or structured environment, after having played videogames, to see if aggression was present. Irwin and

Gross (1995) had 7- and 8-year-old boys play videogames with either an aggressive or nonaggressive theme and then observed participants during a free-play setting and also during a frustrating situation. Results indicated that subjects who had played the game with the aggressive content showed significantly more object aggression during the free-play setting and more interpersonal aggression during the frustrating situation than the boys who had played nonaggressive videogames. Schutte et al. (1988) observed the free-play of 5- to 7-year-old-boys after they had played either aggressive or nonaggressive videogames, and results showed that the observed behavior of the boys was similar to the theme of the game they had played. For example, the boys who played the karate game tended to act more aggressively than those who had played the jungle videogame. Thus, children may imitate the videogames and as a result, aggressive games can lead to aggressive or violent behavior.

Not all research on aggression and videogames has yielded significant findings. Scott (1995) conducted an experiment in which he had undergraduate students play three different videogames varying in amounts of aggression (none, moderate, and high). Afterwards, they filled out the Buss-Durkee Hostility Inventory and the Eysenck Personality Questionnaire to see if there was a change in aggressive affect across the three games. He found no significant relationship between use of the three games and indices of aggression.

Blood Pressure Research

Although high blood pressure affects up to 50 million people in the United States, it remains a medical ("Hypertension" 1996). High blood pressure can lead to heart disease, stroke, and kidney problems. Hypertension is a primary precursor of congestive heart failure (CHF), coronary heart disease (CHD), stroke, cardiac failure, peripheral arterial disease ("High Blood" 1996). Although several other precursors have been identified, hypertension is the most common condition antedating heart failure in the general population. Throughout the studies that these researchers analyzed, the incidence of CHF was greater at increasing blood pressure levels and increased as a function of age and duration of follow-up. ("Hypertension" 1996).

Levy and his associates looked at many studies that included, in all, more than 5000 participants. The studies each entailed long-term follow-up and careful monitoring to study the relative risk and population-attributable risk of hypertension for the development of CHF (Levy et al., 1996). The time course of progression to overt heart failure as a function of hypertension status was also analyzed. Contributions of other risk factors were also important. Hypertensive men and women had a higher risk for development of CHF. Findings of this study support a potentially important role for diastolic dysfunction in hypertensive heart failure. Multivariable analyses using time-

dependent modeling for hypertension and other risk factors revealed that hypertension carried the greatest population-attributable risk for the development of CHF of all risk factors considered (39% in men and 59% in women). Hypertension also had the highest prevalence of all risk factors in this sample (60% in men and 62% in women) (Levy et al 1996).

When looking at the diastolic and systolic levels, it is important to look at each individually. That systolic blood pressure is the more important predictor of cardiovascular risk has been reinforced in recent years by findings from the huge cohort of screenees of the Multiple Risk Factor Intervention Trial (MRFIT) and from the Systolic Hypertension in the Elderly Program (SHEP) ("High Blood" 1996). SHEP demonstrated that treatment of isolated systolic hypertension (ISH) with diuretic-based drug therapy produces remarkable declines in stroke and coronary heart disease (CHD). Since systolic indicates the functioning of the heart at
rest, this would be more important since it shows how hard the heart is generally working to push the blood out. This number is vital to distinguishing good health in a person.

Many treatments have been used with patients with hypertension to alleviate their problems as much as possible. One, of course, is diet. The preponderance of evidence continues to indicate that modest reduction of sodium, as recommended in the 1995 U.S. Dietary Guidelines for Americans, would improve public health. One new discovery is a gene that encodes angiotensin-converting enzyme (ACE), hinting at a susceptibility to hypertension in men, that could help to clarify blood pressure regulation.

Present Investigation

In this pilot investigation the amount of time undergraduate students spend participating in videogame activity was assessed, along with various demographic variables and blood pressure, at rest. Since videogames, particularly action or sports games, simulate involvement in aggressive situations, it is presumed that the players' fight-or-flight response is being activated. This response has been associated with blood chemistry changes (such as elevated triglyceride and free-fatty acid levels) possibly linked to cardiac risks. College students who play these games excessively, therefore, may place themselves at greater risk of developing cardiovascular problems. It was predicted that subjects who participate in higher levels of videogame activity would have the most elevated blood pressure readings.

Method

Participants

Twenty male adults ranging in age from 18 to 22 and three female adults ages 19 to 20 from a small private, liberal arts college on the upper east coast served as subjects in this study.

Apparatus

A brief paper and pencil questionnaire was given to each participant. Each participant had his/her blood pressure taken by a standard blood pressure cuff.

Procedure

A questionnaire was filled out by each participant individually to assess his/her personal videogame and television usage in terms of hours as well as his/her involvement in active exercise in terms of hours. Smoking habits were also assessed in terms of average amount of packs of cigarettes smoked on a daily basis. The subject, sitting at rest, then had his/her blood pressure taken by an experimenter (see Questionnaire).

Results

The overall videogame usage mean was 1.74 hours per day. The mean diastolic BP was 123.48 (s.d. = 10.07); systolic BP had a mean of 80.87 (s.d. = 8.26). Men were expected to be more involved in playing videogames; in this sample, two-thirds of the men played at least one hour daily, while none of the women did. Cigarette smoking was significantly correlated with videogame usage ($p < .05$).

Subjects were grouped according to three levels of videogame usage. The high usage group had a mean blood pressure of 130/83.33 compared to 124.55/83.64 in the moderate use group, and 120/76.67 in the low usage group. Oneway ANOVA did not reveal a significant elevation in blood pressure among subjects in the high videogame usage group, on either systolic or diastolic measurements. However, a oneway ANOVA trend suggested that systolic BP was somewhat lower among those in the lowest videogame usage group, although this finding was not statistically significant ($p = .16$). No significant difference emerged for diastolic BP. Between group t-tests comparing the low and high usage groups also yielded a trend indicating higher systolic BP ($p < .10$) among those in the high versus the low videogame usage group.

Discussion

Videogame activity occupies a significant proportion of students' leisure time (nearly two hours per day in this sample aof college students). Independent of its effects on health parameters, absorption in this form of recreation competes with other activities. Future research might explore which activities students are most likely to sacrifice in order to accommodate their videogame activities. It would be interesting to determine whether those highest in videogame usage are neglecting academic, social, and active exercise pursuits in equal proportion.

The present results did not indicate a strong association between videogame usage and elevated blood pressure, but this may have been due to the limited sample size used in the present investigation. Future studies should assess subject's blood pressure both before and after they had played videogames for at least five minutes. The theorized effect of videogames on the participants' blood pressure levels caused by the activation of fight-or-flight response might be more visible under these conditions.

Smoking habits emerged as a confound in the present investigation. This is a serious limitation, since smoking itself may possibly elevate blood pressure. Use of a larger sample would permit treatment of smoking as a covariate.

Physical activity seems to neutralize some of the problematic blood chemistry changes associated with the fight-or-flight reaction to stressful situations. Since videogame players who remain physically active may attenuate their cardiovascular risks, inclusion of level of regular exercise would be desirable in future investigations of the relationship between cardiovascular problems and videogame usage.

Clearly, more research needs to be conducted to clarify the association between videogam usage and blood pressure elevation. Use of a larger and more representative sample, a longer time-frame, and more sensitive cardiovascular measures would permit a more refined analysis of this potential problem.

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